

REMARKS

This application has been reviewed in light of the final Office Action dated August 22, 2005. In view of the foregoing amendments and the following remarks, favorable reconsideration and withdrawal of the rejection set forth in the Office Action are respectfully requested.

Claims 10-22 are pending in the application. Claims 10, 12, 13, 18, 21 and 22 have been amended. Support for the claim changes can be found in the original disclosure, and therefore no new matter has been added. Claims 10, 18, 21 and 22 are in independent form.

Claims 10-22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,539,433 (*Kawai et al.*) in view of European Patent Application Publication No. 0 811 488 (*Tamura*). While not conceding the propriety of the rejection, the independent claims have been amended. Applicants submit that, for at least the reasons set forth below, the independent claims are patentable over the cited art.

Independent Claim 10 recites, *inter alia*, (1) a selection circuit (common to a plurality of groups of printing elements of an array for selecting a printing element to be driven in each group) that has common lines coupled to the plurality of groups of printing elements of the array for selecting a printing element to be driven in each group, and (2) data supply means comprising a plurality of shift registers, each arranged to supply data for a corresponding set of the printing elements, the shift registers being spaced apart in the direction of the array with each shift register being arranged adjacent to the corresponding set of printing elements. Each of independent Claims 18, 21 and 22 (directed to a print head, a

print head cartridge, and a printing apparatus, respectively) recites features similar or identical to these features of Claim 10.

Conventionally, a data signal line has to be wired from one end of a substrate where data supply means, such as a shift register, is provided to the other end of the substrate where a printing element is provided. In this case, the data signal line extends for a long distance, causing an increase in the wiring area and, accordingly, an increase in the size of the substrate.

On the other hand, according to the invention as set forth in Claim 10, each shift register is arranged adjacent to a corresponding set of printing elements to which the shift register supplies data. Consequently, data supply wiring lines from a plurality of shift registers to respective sets of printing elements are shortened, thereby reducing the wiring area and the total area of the print head substrate.

Furthermore, according to the invention as set forth in Claim 10, a printing element selection operation is performed by a selection circuit having common lines coupled to a plurality of groups of printing elements. Thus, driving timing may be controlled in a unified fashion over the plurality of groups.

Kawai et al. relates to a recording apparatus having a recording head driven in plural blocks, including a half-tone control unit 5 and a thermal head driving unit 50 (see Fig. 1). As shown in Fig. 2, the thermal head driving unit 50 includes a shift register 17 and a latch 16. As seen in Fig. 2, *Kawai et al.* teaches only a single shift register 17, which is provided in an arrayed direction of the printing elements. In contrast, Claim 10 recites a plurality of shift registers, which are spaced apart in the direction of the array.

In that regard, it is noted that the Office Action cited col. 2, lines 15-16 and col. 4, lines 45-52 of *Kawai et al.* as teaching a plurality of data supply circuits, spaced apart in the direction of the array of printing elements with each data supply circuit being arranged adjacent to the corresponding set of printing elements. Col. 4, lines 45-52 state:

The data signals subjected to density control in the halftone control unit 5 and supplied to the thermal head driving unit 50 as explained above are converted into parallel signals in the shift register 17, latched in the latches 16, at the same time supplied to the AND gates A_1 - A_n , and further supplied to the gates of the heat generating elements corresponding to a density level in a line.

Nothing in these portions of *Kawai et al.* is seen to suggest a plurality of shift registers as claimed in the combination recited in Claim 10. Nothing in *Kawai et al.* is understood to suggest a data supply means comprising a plurality of shift registers, each arranged to supply data for a corresponding set of the printing elements, the shift registers being spaced apart in the direction of the array with each shift register being arranged adjacent to the corresponding set of printing elements, as recited in Claim 10.

In addition, as is understood to have been conceded by the Office Action (page 3), nothing in *Kawai et al.* would suggest a selection circuit (common to a plurality of groups of printing elements of an array for selecting a printing element to be driven in each group) that has common lines coupled to the plurality of groups of printing elements of the array for selecting a printing element to be driven in each group.

At least for the above reasons, *Kawai et al.* is not understood to suggest that data is supplied to a printing element from a nearby shift register among a plurality of shift registers, and a printing element to be driven is selected from each printing element group by a common selection signal. Since *Kawai et al.* has only one shift register, the length of wiring lines from

the shift register to the printing elements is understood to be longer than that in the invention as set forth in Claim 10.

Tamura relates to a recording head and recording apparatus including N blocks each having M recording elements. However, as shown, for example, in Figs. 5, 8 and 10, *Tamura* teaches only one shift register and latch. Nothing in *Tamura* is understood to suggest at least a data supply means comprising a plurality of shift registers, each arranged to supply data for a corresponding set of the printing elements, the shift registers being spaced apart in the direction of the array with each shift register being arranged adjacent to the corresponding set of printing elements, as recited in Claim 10.

Since neither *Kawai et al.* nor *Tamura*, whether taken singly or in combination (even assuming, for the sake of argument, that such combination were permissible), contains all of the elements of independent Claim 10, that claim is believed allowable over the cited art. Since each of independent Claims 18, 21 and 22 recites features similar or identical to the above-discussed features of Claim 10, Claims 18, 21 and 22 are believed allowable over the cited art for the same reasons.

A review of the other art of record has failed to reveal anything which, in Applicant's opinion, would remedy the deficiencies of the art discussed above, as references against the independent claims herein. Those claims are therefore believed patentable over the art of record.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the

invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

Applicant submits that this Amendment After Final Rejection clearly places the subject application in condition for allowance. This Amendment was not presented earlier, because Applicant believed that the prior Amendment placed the subject application in condition for allowance. Accordingly, entry of the instant Amendment, as an earnest attempt to advance prosecution and reduce the number of issues, is requested under 37 C.F.R. § 1.116.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



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